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ABSTRACT

Whether two-way visual contact between an instructor and students would promote dialogue during teleconferenced instruction was studied, and the types of verbal dialogues that might be affected by two-way video contact were explored. The following three types of instruction were assessed: (1) Group A, teleconferenced instruction in which students had only two-way audio contact with the instructor; (2) Group B, teleconferenced instruction in which students had two-way audio and video contact with the instructor; and (3) Group C, traditional face-to-face instruction. Fifteen hypotheses were tested based on the research question. Subjects were 172 college juniors or seniors pursuing teacher certification in an educational technology class at the University of Northern Colorado. Audio-only and audio-video groups did not differ significantly in any of the verbal interaction categories (as recorded by videotape). This phenomenon may be related to the passive nature of television viewing and suggests that distance education instructors who want to maximize student participation may need to do more than focus the camera on themselves. A second general pattern was that the traditionally instructed group interacted significantly more than the other groups in several categories of verbal interaction. Findings support the idea that students are more likely to interact when the instructor is physically present. Five tables present study data. (Contains 10 references.) (SLD)

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ED 363 299

Effects of Two-Way Visual Contact on Verbal Interaction During Face-to-Face and Teleconferenced Instruction

by
Jeffrey W. Bauer and Landra L. Rezabek

Rationale

Traditionally, audio teleconferencing has been a convenient method of bringing students together for distance learning (Wagner & Reddy, 1989). In addition to audio teleconferencing, some colleges and universities have been experimenting with more sophisticated technologies that incorporate computer graphics (audio graphic teleconferencing), full motion video distributed via satellite, cable, or microwave, and other less costly audio/video teleconferencing systems such as slow-scan or compressed video (Ritchie & Newby, 1989; Wagner & Reddy, 1989).

Developers of more sophisticated teleconferencing systems claim that these systems are superior to the traditional audio-conferencing systems because they offer the added benefit of *visual* contact among students and instructors which promotes interaction (dialogue) during instruction. However, there are few research studies that have actually studied interaction during teleconferences. The purpose of this study was to determine whether two-way visual contact between an instructor and students would promote dialogue during teleconferenced instruction. Furthermore, researchers wanted to study the specific types of verbal interactions that might be affected by the addition of two-way video contact. For example, would students ask more questions if they could see the instructor? If so, what types of questions would they ask? Would the types of responses given by students differ if two-way video contact was available during teleconferenced instruction? How would they differ from responses given during audio teleconferencing where there was no visual contact between the instructor and the students? These are some of the questions that researchers investigated in this experiment.

Problem

Researchers investigated whether there was a difference in either the overall frequency or the frequency of specific types of student verbal interactions among the following three groups: **Group A,** teleconferenced instruction where students had only two-way audio contact with the instructor; **Group B,** teleconferenced instruction where students had two-way audio and video contact with the instructor; **Group C,** traditional face-to-face instruction.

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Hypotheses

Fifteen hypotheses were formulated based on the research question. The first hypothesis stated that the total number of student responses in the two-way audio-only group (Group A) would be significantly less than the number of responses given by students in the two-way audio/video group (Group B). Similarly, the second hypothesis predicted that the number of student responses in the two-way audio-only group, (Group A) would be significantly less than the number of responses given by students in the traditional face-to-face group (Group C). The third hypothesis predicted that students in the two-way video group (Group B) would give fewer responses than students in the traditional face-to-face group (Group C). In equation form the first three hypotheses were as follows:

Total number of Student Interactions Given During Instruction

1. **Group A < Group B**
2. **Group A < Group C**
3. **Group B < Group C**

The next three hypotheses dealt with a specific type of interaction called "Restricted Thinking Questions" which was defined as, "Request for responses that have an accepted, predetermined correct answer; factual knowledge or simple recall; lower levels of cognition" (Ober, Bentley, & Miller, 1971, p. 88). Again, hypothesis four predicted that students in the audio-only group would give fewer of these types of responses than students in the audio/ video group. In equation form, Hypotheses 4-6 were:

Restricted Thinking Questions Asked During Instruction

4. **Group A < Group B**
5. **Group A < Group C**
6. **Group B < Group C**

Hypotheses 7-9 concerned another category of interaction called "Expanded Thinking Questions" which was defined as, "Request for information that involves open-ended responses, generation and application of principles, concepts, and generalizations; solutions generated by applications of rules or procedures; answers to how, why, what do you think; higher levels of cognition" (Ober, Bentley, & Miller, 1971, p. 88).

Expanded Thinking Questions Asked During Instruction

7. **Group A < Group B**
8. **Group A < Group C**
9. **Group B < Group C**

Hypotheses 10-12 concerned a category called "Restricted Thinking Responses" which was defined as, "Factual knowledge; an accepted or pre-determined correct answer; facts previously learned or easy to produce; lower levels of cognition" (Ober, Bentley, & Miller, 1971, p. 88).

Restricted Thinking Responses Given During Instruction

10. **Group A < Group B**
11. **Group A < Group C**
12. **Group B < Group C**

The final category of verbal interactions, "Expanded Thinking Responses," was defined as, "Open-ended responses; generation and application of rules or procedures; answers to how, why, what do you think; higher levels of cognition" (Ober, Bentley, & Miller, 1971, p. 88).

Expanded Thinking Responses Given During Instruction

13. **Group A < Group B**
14. **Group A < Group C**
15. **Group B < Group C**

Significance of the Problem

Most of the research in distance education consists of comparisons between traditional on-campus courses and their distance counterparts (Ritchie & Newby, 1989). Verbal interaction is rarely reported in these intermedia studies; in fact, student/teacher verbal interaction is often not permitted during instruction in order to avoid introducing an uncontrollable variable (Salomon & Clark, 1977),

Evidence suggests that students' perceived achievement and affect toward the subject and instructor are related to student/teacher interaction. When high levels of verbal interaction are present, students report that they learn more and enjoy the experience more than in situations that involve low levels of student/teacher interaction (Richmond, Gorham, & McCroskey, 1987; Gorham, 1988).

During audio teleconferences, nonverbal interaction is not transmitted between remote sites; however, during video teleconferences nonverbal information is transmitted. Research by Wiener and Mehrabian (1968) and Mehrabian (1971, 1972) suggests that some nonverbal information has the potential of inducing verbal interaction. Since verbal interaction is considered to be desirable during instruction, a case could be made for developing and utilizing distance delivery systems that provide optimum potential for two-way student/teacher interaction. In order to do so, such systems would require two-way video capabilities in order to transmit nonverbal information to remote sites. Institutions must be convinced that the benefits are worth the costs before investing in these resources. By measuring the benefits in terms of the potential for student/teacher interaction rather than exam scores and course grades, the benefits may, indeed, justify the costs.

Methods and Procedures

One-hundred seventy-two students enrolled in four separate sections of *Classroom Educational Technology* (ET 401) during the Fall Semester, 1991, at the University of Northern Colorado (UNC) took part in the study. All of the students were juniors or seniors pursuing teacher certification in Colorado.

Two-way audio /video teleconferencing facilities exist between two buildings, McKee Hall and Frazier Hall, on the UNC campus. The buildings are about one-half mile apart. The instructor taught from the Frazier Hall site while students met in the McKee Hall site. For the traditional face-to-face treatment, both the students and the instructor met in the McKee Hall site. Each site was equipped with 26" monitors plus all of the necessary hardware and software in order to operate either a two-way audio-only teleconference, or a two-way video teleconference.

Treatment Group A received instruction delivered via two-way audio-only teleconference. Students in this group could only hear the instructor. Treatment Group B received instruction delivered via two-way audio/video teleconference. Students in this group could both hear and see the instructor, and the instructor could both

hear and see the students. Treatment Group C received instruction delivered in a traditional face-to-face manner. All groups received exactly the same instruction delivered by the same instructor.

Two lessons were delivered to each treatment group. The first lesson was used to desensitize the students to the newness of the instructional situation and no data were collected. Data were collected during the second lesson. The formats of the two lessons were similar. Students were given handouts followed by a short presentation by the instructor. A series of open-ended questions were then discussed. The instructor employed a standard wait time of five seconds after posing a question. If students did not respond, an additional call for responses was given before moving on to the next question. Instructional methods were consistent across all three treatment groups.

The instruction was videotaped and the videotapes were viewed and student questions and responses were coded according to the verbal interaction categories outlined in the Hypotheses. The reviewers awarded each student one point for each verbal response or question given in the appropriate interaction category. Figure 1 summarizes the treatment groups and Figure 2 summarizes the verbal interaction categories.

Figure 1. Summary of Treatment Groups

Treatment Group	Type of Treatment
A. Audio-only	Two-wayaudio-only teleconferenced instruction
B. Audio/video	Two-way audio and video teleconferenced instruction
C. Traditional	Face-to-face instruction

Figure 2.
Summary of Verbal Interaction Categories

1. **Total number of verbal interactions**
2. **Restricted thinking questions**
3. **Expanded thinking questions**
4. **Restricted thinking responses**
5. **Expanded thinking responses**

Results

A series of one-way ANOVA's and Dunn's t-tests were conducted for each of the verbal interaction categories to determine whether there were differences among the three treatment groups. The following tables summarize the results for each of the categories.

Table 1. ANOVA Summary Table for Total Number of Student Responses by Group and Dunn's Test

Source	df	SS	MS	F
Between Groups	2	270	135	9.09*
Within Groups	169	2510	15	
Total	171	2781		

(*p<.05)

Dunn's Post Hoc Test

Hypothesis	Group Comparison	Difference
1	A & B	0.0946
2	A & C	2.26216*
3	B & C	2.7163*

(*Significant at .05)

An F value of 9.09 indicated significance. A follow-up Dunn's t-test indicated that the difference was between the traditional and audio-only group and between the traditional and audio/video group. In both cases, students in the traditional group interacted more than students in the audio-only and the audio/ video groups.

Table 2. ANOVA Summary Table for Restricted Thinking Questions by Group and Dunn's Test

Source	df	SS	MS	F
Between Groups	2	3.41	1.71	4.02*
Within Groups	169	71.81	0.42	
Total	171	75.23		

(*p<.05)

Dunn's Post Hoc Test

Hypothesis	Group Comparison	Difference
1	A & B	0.0111
2	A & C	0.2945
3	B & C	0.3056*

(*Significant at .05)

An F value of 4.02 indicated significance. A follow-up Dunn's t-test indicated that the difference was between the traditional and the audio/video group. Students in the traditional group asked more restricted thinking questions than students in the audio/video group.

Table 3. ANOVA Summary Table for Expanded Thinking Questions by Group and Dunn's Test

Source	df	SS	MS	F
Between Groups	2	5.71	2.86	3.37*
Within Groups	169	143.28	0.85	
Total	171	149.00		

(*p<.05)

Dunn's Post Hoc Test

Hypothesis	Group Comparison	Difference
1	A & B	0.1354
2	A & C	0.1386
3	B & C	0.4325*

(*Significant at .05)

An F value of 3.37 indicated significance. A follow-up Dunn's t-test indicated that the difference was between the traditional and the audio/video group. Students in the traditional group asked more expanded thinking questions than students in the audio/video group.

Table 4. ANOVA Summary Table for Restricted Thinking Responses by Group and Dunn's Test

Source	df	SS	MS	F
Between Groups	2	59.15	29.57	10.35*
Within Groups	169	482.97	2.86	
Total	171	542.12		

(*p<.05)

Dunn's Post Hoc Test

Hypothesis	Group Comparison	Difference
1	A & B	0.1039
2	A & C	1.1917*
3	B & C	1.2956*

(*Significant at .05)

An F value of 10.35 indicated significance. A follow-up Dunn's t-test indicated that the difference was between the traditional and the audio-only group and between the traditional and audio/video group. Students in the traditional group gave more restricted thinking responses than students in the audio-only and the audio/video group.

Table 5. ANOVA Summary Table for Expanded Thinking Responses by Group and Dunn's Test

Source	df	SS	MS	F
Between Groups	2	20.88	10.44	3.55*
Within Groups	169	496.77	2.94	
Total	171	517.65		

(*p<.05)

Dunn's Post Hoc Test

Hypothesis	Group Comparison	Difference
1	A & B	0.1180
2	A & C	0.8005*
3	B & C	0.6825

(*Significant at .05)

An F value of 3.55 indicated significance. A follow-up Dunn's t-test indicated that the difference was between the traditional and the audio-only group. Students in the traditional group gave more expanded thinking responses than students in the audio-only group.

Conclusions, Implications, and Recommendations

In general, two patterns emerged from this study. First, the audio-only and audio/video groups did not differ significantly in any of the verbal interaction categories. According to the literature on the Immediacy Principle (Wiener & Mehrabian, 1968; Mehrabian 1971, 1972), certain nonverbal immediacy behaviors should induce verbal interaction. Since the audio/video group had the added benefit of two-way visual contact with the instructor, researchers predicted that these immediacy behaviors would be transmitted to this group. Conversely, the audio-only would not be subjected to these immediacy behaviors. The result should have been that student verbal interaction in the audio/video group was significantly greater than student verbal interaction in the audio group if the Immediacy Principle held. The Immediacy Principle was the basis for Hypotheses 1, 4, 7, 10, and 13. In each of these researchers predicted that the audio/video group would interact significantly more than the audio-only group. Yet each of these hypotheses was rejected. The immediacy behaviors observed by the audio/video group did not result in a significant increase in student verbal interactions during instruction.

This phenomenon may be related to the passive nature of television viewing. Even though instruction was delivered live and there were two-way audio/video capabilities, students may have slipped into a passive viewing mode where their cognitive engagement waned during the instruction (Brown, 1988). Follow-up conversations with some of the participant yielded information that supports this thesis. Some students reported that they found it difficult to concentrate on the lesson when they were looking at a video image of the instructor. Several students said that they could only concentrate on the lesson when they were looking at the handouts or away from the video monitors. As a result, the nonverbal cues given by the instructor had little effect on the number of verbal interactions that took place during the lessons.

The implications of this finding on improving distance education are that if instructors want to take advantage of the added benefits of two-way video contact in order to maximize student participation, they must do more than focus the cameras on themselves during instruction. Further research could be conducted to determine how the video signal could best be utilized in order to maximize student participation.

The second general pattern that emerged was that the traditional group interacted significantly more than the audio-only and the audio/video groups in several of the verbal interaction categories. Hypotheses 2, 3, 6, 9, 11, 12, and 14 were all accepted. This finding was supported by the literature on the Immediacy Principle. The instructor's nonverbal cues in the traditional group did succeed in inducing student verbal responses. An additional research project could be designed to determine whether nonverbal cues such as hand gestures, smiles, and nods have the same effect in audio/video teleconferencing as they do in traditional face-to-face settings.

It is difficult to claim summarily that the different types of instructional delivery modes used in this experiment were solely responsible for the significant differences found in Hypotheses 2, 3, 6, 9, 11, 12 and 14. One of the limitations of this study was the fact that classrooms are complex social

environments. Indeed, there were many events that took place during the audio-only and the audio/video teleconferences as well as during the traditional sessions that supported this notion. Such events do not appear in the quantitative data reported in this study. Nevertheless, this study was concerned with the effects of visual cues on verbal interaction during instruction delivered via three different modalities. The findings support the idea that students are likely to interact more when the instructor is physically present in the room with them. However, the addition of a video signal to an audio teleconferencing system in and of itself is not likely to increase student verbal interaction during teleconferenced instruction.

References

Brown, C. (1988). The live video conference in distance learning. *Lifelong Learning: An Omnibus of Practice and Research, 15*(5), 8-24.

Gorham, J. (1988). The relationship between verbal teacher immediacy behaviors and student learning. *Communication Education, 37*, 40-53.

Mehrabian, A. (1971). *Silent messages.* Belmont, CA: Wadsworth.

Mehrabian, A. (1972). *Nonverbal communication.* Chicago: Aldine-Atherton.

Ober, R., Bentley, E., & Miller, E. (1971). *Systematic observation of teaching* . Englewood Cliffs, NJ: Prentice Hall.

Richmond, V., Gorham, J., & McCroskey, J. (1987). The relationship between selected immediacy behaviors and cognitive learning. In L. Barker *Communication Yearbook, 10* (pp. 574-590). New Brunswick, NJ: Transaction Books.

Ritchie, H., & Newby, T. (1989). Classroom lecture/discussion vs. live televised instruction: a comparison of effects on student performance, attitude, and interaction. *American Journal of Distance Education, 3*(3), 36-45.

Salomon, G., & Clark, R. (1977). Reexamining the methodology of research on media and technology in education. *Review of Educational Research, 47*(1), 99-120.

Wagner, E., & Reddy, N. (1989). Design considerations in selecting teleconferencing for instruction. In M. Moore & G. Clark (Eds.) *Readings in Distance Learning and Instruction* (pp. 96-103). University Park, PA: The Pennsylvania State University.

Wiener, M., & Mehrabian, A. (1968). *Language within language: Immediacy, a channel in verbal communication.* New York: Appleton-Century-Crofts.